

TWO NEW PARASITE RECORDS AND NOTES ON  
*PETROVA ALBICAPITANA* (BUSCK)  
(LEPIDOPTERA: OLETHREUTIDAE) ON JACK  
PINE, *PINUS BANKSIANA* LAMB. IN MAINE<sup>1</sup>

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ABSTRACT: The distribution and some aspects of the natural control of *Petrova albicapitana* (Busck) were determined. Two parasites, *Hyssopus thymus* (Gir.) and *Phrynofrontina* prob. n. sp. were reared for the first time from this host.

The pitch nodule maker, *Petrova albicapitana* (Busck) bores into pine shoots and causes pitch blisters on twigs of jack pine, *Pinus banksiana* Lamb., Scots pine, *P. sylvestris* L. and lodgepole pine, *P. contorta* Dougl. Severe deformation may result when branches and terminal shoots are girdled and killed. This insect attacks trees of varying ages, and populations may be heavy on trees from 0.3 to 1.5 meters in height and in mature (50 to 60 year) stands (Turnock 1953, McLeod and Tostowaryk 1971).

The life history and ecology of *P. albicapitana* in Manitoba and Saskatchewan was studied by Turnock (1953). *P. albicapitana* has a two-year life cycle. Eggs are laid from early June to mid-July on tips of the new growth. During the remainder of the summer, larvae feed at this site, making small blisters of pitch and silk on the stems. Larvae overwinter within these pitch blisters and feed in them for a short time the following spring. They then migrate down the branch to a crotch and construct a large nodule of pitch, frass and silk, where they feed throughout the second year. Larvae spend the second winter in this nodule which becomes hard and darkened in winter. Larvae continue feeding the second spring and fresh pitch appears adjacent to the old pitch nodule. In May, larvae pupate in a chamber constructed within the nodule. One end of this chamber is covered by a very thin layer of pitch and silk and adults emerge through this exit in June. This species has two broods which emerge in alternate years. One brood is usually much smaller than the other. Turnock (1953) reported that 12 species of parasites attack this host.

There have been no previous studies of *P. albicapitana* in the eastern United States. The present study was undertaken to determine the distribu-

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tion of *P. albicapitana* in Maine and the parasites and other mortality factors affecting it.

### Methods

In 1979, all areas known to contain jack pine were checked to determine the distribution of *P. albicapitana* in the state. At this time a visual estimation of population density was made.

The area selected for study was located in Deblois. On June 2, 1978, branches from several large (25 year old) trees, which contained 117 pitch masses of the 1977-79 brood, were collected for parasite rearing and mortality studies. An additional 157 masses were collected from both large and small trees on June 2 and 4 to obtain additional parasites. *P. albicapitana* was in the pupal stage at this time. In July 1979, the number of pitch masses of *P. albicapitana* were counted on 100 small trees (0.6 — 3 meters in height) to determine the relative abundance of each brood.

Twigs with pitch masses were kept at room temperature on 0.5 liter, airtight plastic containers. Needles were removed to prevent excess moisture and fungal growth. Containers were checked twice daily and emerging insects were killed by freezing. Since *P. mafica* Miller (Miller 1978) has previously been reared with *P. albicapitana* from blister-bearing twigs on jack pine (McLeod and Tostoworyk 1971), all emerging moths were examined to confirm their identity. Pitch masses, from which no insects emerged, were dissected to determine the number of dead hosts and parasites.

The amount of new pitch produced on the pitch mass in the spring of pupation was thought to be an indicator of larval health. Therefore, the diameter of new pitch produced in the spring was measured. If masses were not spherical, diameters were calculated from the average of several measurements.

### Results and Discussion

#### Distribution and Abundance

*P. albicapitana* was found in five localities in central Maine (Fig. 1). Many trees from .3 - 8 meters in height contained a pitch mass at nearly every crotch on the main stems and branches at the study area in Deblois. Much lighter infestations were found in a 44 year old plantation on the University Forest in Orono, in natural jack pine up to 5 meters in height near Debsconeag Deadwater (Twp. 2, Range 9), in a 25 year old Twp. 30 plantation, and on a second 25 year old plantation in Deblois. None were found in an 80 year old stand of jack pine in Lake Parlin (Somerset County).



Fig. 1. Distribution of *P. albicapitana* in Maine.

In the Deblois study area the 1977-79 brood was much larger than the 1979-80 brood. All of the 146 pitch masses found on the 100 small sample trees belonged to the 1977-79 brood. Only one 1978-80 brood pitch mass was found after examination of several hundred trees.

All specimens of *Petrova* reared in this study were those of *P. albicapitana*.

### Natural Control

Mortality encountered in the sample of 117 pitch masses from known and unknown causes was as follows. Sixteen pitch masses (13.7%) were destroyed by breakage of twigs by wind or other causes. Twenty-four masses (20.5%) contained dead larvae; 19 having died before the resumption of feeding in the spring. The remaining five contained mature larvae in the feeding chamber, which was filled with pitch. Twenty-one (17.9%) died in the pupal state, and 8 (6.8%) as moths during emergence. Parasitism accounted for the remaining mortality of 10.3%. Thirty-six moths (30.8%) emerged successfully.

The amount of new pitch was found to an indicator of larval health. Seventy-nine percent of the 24 pitch masses with dead larvae had no new pitch, and 100% mortality occurred in masses which contained less than 5 mm of new pitch. Moths emerged from pitch masses with a mean diameter of 12 mm of new pitch.

Table 1 shows the relative abundance of four species of parasites reared from a total of 274 pitch masses of *P. albicapitana*. Turnock (1953) reported that parasitism rates were generally low. He theorized that since parasites had a one-year life cycle and attacked only year old migrating host larvae, the smallest of the two broods limited the parasite population and protected the larger brood from heavy parasitism. The low parasitism rate of 6.9% in the present study was expected since one brood was much larger than the other.

Table 1. Parasites reared in the laboratory from 274 pitch masses of *P. albicapitana* in Maine.

Species:	Number of <i>P. albicapitana</i> parasitized
<i>Phrynofrontina</i> prob. n. sp. (Tachinidae)	5
<i>Apanteles petrovae</i> (Braconidae)	1
<i>Exeristes comstockii</i> (Ichneumonidae)	1
<i>Hyssopus thymus</i> (Eulophidae)	12

*Phrynofrontina* prob. n. sp. emerged from pitch masses which were of normal size and contained normal amounts of new pitch. These solitary larval parasites left the host and pupated near the exit. *Phrynofrontina* sp. was reared from larvae of *Petrova metallica* (Busck) in the Canadian Rockies (Stark 1957), but the genus had not been previously reported from *P. albicapitana*.

One specimen of *Apanteles petrovae* Walley emerged from a pitch mass which had no fresh pitch present, and a single specimen of *Exeristes comstockii* (Cr.) emerged from a mass with little new pitch. Turnock (1953) reported these species emerging from pupae of *P. albicapitana* in Canada.

*Hyssopus thymus* Girault emerged during June 10-13. From one to 12 individuals emerged from each of the four pitch masses containing normal amounts of new pitch. Remains of dead and emerged *H. thymus* were found in eight additional masses containing no new pitch. Miller (1955) reared this parasite from *P. comstockiana* (Fernald) and reported than an overwintering generation emerges in April and a summer generation from late May to early June. Thus, it seems that masses containing no new pitch were parasitized by the overwintering generation, and parasites emerging in June might have been second generation parasites. It should be noted that

high populations of *P. comstockiana* exist in coastal areas approximately 10 miles from the study area. *H. thymus* has not been previously reported from *P. albicapitana*.

#### ACKNOWLEDGEMENTS

The authors wish to thank Drs. C.W. Carlson, E.E. Grissell, P.M. Marsh, and C.W. Sabrosky for their kind assistance in determining the taxonomic status of various specimens of Diptera and Hymenoptera; and Drs. D.G. Boucias, H.Y. Forsythe, Jr., and R.H. Storch, Department of Entomology, University of Maine, Orono, for helpfully reviewing the manuscript.

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